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Role of Commitment and Motivation in Knowledge Management Systems Implementation: Theory, Conceptualization, and Measurement of Antecedents of Success

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Abstract

Our ignorance exceeds our knowledge where issues of motivation and commitment of knowledge workers are concerned in the context of knowledge management systems (KMS) implementation [1,16,17,18]. This study is motivated by the pervasive confusion about the role of knowledge workers' motivation and commitment in KMS implementation and sparse, if any, theoretical or empirical research on these issues. This paper proposes a theoretical framework for understanding how knowledge workers' commitment and motivation affect the use of KMS and resulting organizational performance of the KMS. The theoretical and empirical validation of the framework require first and foremost the theoretical development of the knowledge workers' commitment and motivation constructs and empirical validation of these constructs in the context of a real world organizational study of KMS implementation. The authors attempt to fulfill these specific goals within the scope of this paper. Future empirical research on the integration of motivation and commitment within diverse implementation contexts of KMS and organizational knowledge management programs is expected to further advance the theoretical and empirical development of the proposed framework.

1. Introduction

Diverse interpretations of knowledge management systems (KMS) [1,16,18,22,23,24,25,26,27,28,29,38] suggest some common attributes shared by such systems. A review of such interpretations indicates that most KMS: (i) are based upon some combination of information-enabled communication, coordination, and collaboration capabilities; (ii) provide the critical link between the information and technology resource *inputs* and organizational performance; and, (iii) are critically dependent upon active participation and involvement of knowledge workers to transform the above inputs into organizational performance. Not surprisingly, despite the availability of the best technology or access to the richest warehouses of relevant information, knowledge workers' motivation and commitment often determine the success or failure of knowledge management systems [16,18]. Similarly, knowledge workers' motivation and commitment play a critical role in enabling sharing of tacit and explicit knowledge [39,42]. Given their importance, it might at first seem surprising that notions of motivation and commitment have not been refined in the existing literature on KMS. However, these notions have only recently been refined in the literature of social psychology (cf: [7,14,15,20]). What is needed is a richer conceptualization of motivation and commitment in a knowledge management context for development and empirical validation of these constructs in a real world organizational study of KMS implementation [17].

This paper contributes to the theoretical conceptualization of KMS user commitment and motivation constructs and their empirical validation in an organizational field study. The context of the study is the organizational adoption of an enterprise wide KMS to facilitate communication, coordination, and collaboration system for enabling organizational performance. Better understanding of these constructs is anticipated to contribute to development of organizational knowledge cultures characterized by high levels of commitment and motivation, the two factors deemed critical for the success of any KMS implementation [1,45].

2. Background

Motivation and commitment of knowledge workers, professionals, and managers are being increasingly realized as critical success factors for the implementation of enterprise knowledge management systems. Researchers (cf: [8]) have observed that unsuccessful KM projects had "struggled to get organization members to contribute to repositories" and "the motivation to create, share, and use knowledge is an intangible critical success factor for virtually all knowledge management projects."

Industry surveys (cf: [16], [18]) have consistently reinforced the critical importance of user commitment and motivation in success of organizational KMS implementations regardless of geographic and industry differences. The same surveys have also highlighted that marked confusion exists in practice about what can be done to alleviate the lack of user motivation and commitment in organizational settings.

A case in point is that of Pillsbury Co. of Minneapolis where a scientist proposed creating a forum in which everyone could contribute knowledge about all aspects of batter and related products [2]. The IT department built the system, seeded it with a few thought-

provoking questions, and invited participation via e-mail to all relevant parties. After waiting for six months, the scientist found that not a single user had signed on. The application was deemed a failure and shut down. In retrospective, the organizational diagnosis of the failure of the KMS concluded that there was no incentive for anyone to invest time and energy to solve other people's problems. Many other KMS implementations have met the same fate (cf: [4]) of the unfulfilled vision of the 'field of dreams.' Even when formal incentives were deployed, organizational KMS often failed to stimulate sharing of knowledge. In some cases, incentives cajoled employees into meeting their monthly or annual quota of 'points' for knowledge shared regardless of the quality or value of the information that they share. Such horror stories of KMS implementations have increased organizational urgency for building a shared sense of motivation and commitment across the enterprise [5,44].

Why do organizations often struggle with incentives for knowledge sharing for users of KMS when sharing of knowledge occurs without any incentive whatsoever in several public online communities? Why do million dollar investments in KMS fail to whet the interest of employees while some of the same employees regularly share knowledge in external online communities? These and other similar questions challenge the existing wisdom about harnessing knowledge workers' motivation and commitment in the success of KMS implementations. This study seeks to develop the theoretical understanding of motivation and commitment constructs in the context of KMS use and develop related measures for addressing such issues.

3. Theoretical Bases for the Study

The conceptualization of knowledge workers' commitment and motivation discussed here develops a theoretical basis for understanding the fine balance between knowledge workers' concerns about fulfillment of their own potential and the need to improve organizational performance. Refinement and validation of the measures of these constructs is done within the context of *performance based training* focused on specific activities of communication, coordination, and collaboration. The specific context of performance oriented information and communication activities pre-specified and approved by organizational managers formed the basis for user training. User response data collected immediately after *performance based training* has particular significance for understanding knowledge workers' motivation and commitment as they relate to organizational performance.

3.1 Theoretical Bases of KMS User Commitment

Industry surveys indicate that while the executive board and senior management drive development of KMS, they often fail to motivate the rest of the organization [18] to adopt these systems. Reasons often cited for failing to meet performance expectations or negligible user uptake of KMS include insufficient communication, failure to integrate KMS in everyday activities, a sense of little personal benefit for the user, lack of time to share knowledge, failure to use knowledge effectively, and difficulties of capturing tacit knowledge [1].

Many forces are at work in KMS acceptance when implementation is driven from top: some workers wish to please their managers; some conform to demands imposed by performance criteria; and some conform to peer pressures. Given that proactive use of KMS is a prerequisite for alleviating many of the problems of ineffective use of knowledge and knowledge sharing, many researchers and practitioner experts have recommended the use of incentives and cultural interventions. However, execution of these recommendations is limited by incomplete understanding of the problem at hand as well as the means for solving it: fostering commitment and motivation that is necessary for the success of KMS implementation.

3.1.1 The Continuum of Commitment

While most discussions of knowledge management have treated commitment as a binary variable, underlying theory suggests otherwise. Commitment can be better represented in terms of a continuum ranging from negligible or partial commitment to absolute commitment to the KMS, and, from avoidance (nonuse) to meager and unenthusiastic use (compliant use) to skilled, enthusiastic and consistent use (committed use) of the KMS.

This view draws upon Kelman's [19] theory of social influence that explains theoretical distinctions between the varied processes by which social influences affect behavior. Kelman's distinctions include the three processes of *compliance* (to gain a reward), *identification* (to establish or maintain relationships), and *internalization* (when the behavior is congruent with value system). This perspective has been used in previous research to explain users' adoption of new information systems (cf: [10]) and other innovations (cf: [21]).

3.1.2 Commitment by Compliance

When the adopted behavior is primarily a result of incentives, rewards, or punishments, the user may not necessarily appreciate or understand the value of the desired behavior. Given that the primary focus of the compliant knowledge workers' attention is on the 'carrot or stick', emphasis is more on maximizing the *incentive*, and *not* necessarily on maximizing the *value added by one's own contributions*.

Quantity-based incentives for knowledge sharing or knowledge may lead to minimal investment in the process itself wherein users may try to maximize incentives through high quantity of contributions of low value. In the longer run, this scenario would result in information glut that would require dramatically increased

effort to find high quality information of value in specific organizational contexts.

3.1.3 Commitment by Identification

With commitment by identification, the adopted behavior is primarily a result of the knowledge workers' need for acceptance by peers and managers and esteem based upon such recognition. Through such identification processes, knowledge workers seek to adopt the values, beliefs, or behaviors associated with other well known, recognized, or popular figures in order to emulate their perceived social image.

Two caveats are important about the effectiveness of the social influence processes of identification. First, the specific role models should be chosen carefully as knowledge workers primarily identify with these social characters and not necessarily with their espoused values or related behaviors. Second, regardless of the conformity of behavior, the specific content of the induced behavior is more or less irrelevant to the knowledge worker.

3.1.4 Commitment by Internalization

Most organizations and managers emphasize the need for imparting values that may serve as guides for cultivating and sustaining specific behaviors. This is not surprising given that values have a much long-lasting effect than rewards, punishments, or social recognition in sustaining desired behaviors. Internalization of values, rather than focus on extrinsic rewards or social referents, ensures that the knowledge worker is invested at the deepest level in the prescribed behavior that serves the specific values.

Given that commitment in this case is self-referential and self-generated, there may be lesser probability of deceiving or cheating the process to maximize incentives or rewards. In this case, the knowledge worker is genuinely invested in contributing to the value added in the knowledge processes. It is likely that the knowledge worker will try to maximize one's value added contributions with minimal incentive for cheating by artificially inflating the quantity of contributions or by degrading the quality of such contributions. The emphasis is on genuinely striving to share insights through detailed and meticulous descriptions and less on ensuring minimal compliance of the monthly or annual quota of points.

Compliance can result in behavior modification only if the organizational managers have control over the knowledge workers whose behavior they want to change. Identification will serve as a basis for behavior change only if there is strong affiliation between the established role models and the knowledge workers whose behavior needs to be 'modeled' accordingly. As noted earlier, both compliance and identification can be manipulative as they may be used to cause behavior change through rewards, punishments, and social recognition. In contrast, internalization represents a self-governing process of commitment that produces more lasting change in behavior.

The above processes describe the *varieties of influence* [41] that may exist alone or in combination along a *continuum of use of the KMS*: from avoidance or pro-forma and uninvested use of system or information resources on one extreme to their committed and enthusiastic use on the other extreme [21].

The next section describes in detail the theoretical bases for knowledge workers' motivation so that a better understanding of knowledge workers' behavior is possible based upon an integrated perspective of processes underlying commitment and motivation.

3.2 Theoretical Bases for KMS User Motivation

Often the issue of motivation generates strong debate about incentives for knowledge workers [9]. Regardless, it is recognized that rewards depend to a great extent on the cultural norms in an organization or group. Wenger et al. ([44], p. 181-183) describe the use of rewards and incentives for contributions to KM programs in organizations such as Daimler-Chrysler, McKinsey, World Bank, and Xerox. At Daimler-Chrysler the "executive Tech Clubs" are responsible for reviewing the results of engineering Tech Clubs with emphasis on quantitative data about contributions to knowledge assets such as completed sections of the Engineering Book of Knowledge (EBoK). At McKinsey, competitive presentations of various practice-development teams are held at luxury resorts with attention and recognition from peers and senior directors offered as inducements for the winning teams.

Wenger et al. ([44], p. 182) observe that rewarding "voluntary" behavior poses a dilemma: "How do we encourage behavior through extrinsic means when the intrinsic motivation for such behavior is considered a matter of pride and identity?" They observe that people often value the satisfaction derived from giving for reasons of professional affiliation or commitment to a larger cause, not because they are rewarded with a "carrot". They offer the example of Xerox technicians who value their name being posted "in lights" before thousands of peers over small financial incentives. For similar contexts, they observe that: (a) recognition by peers, not financial rewards, is the primary motivator for community participation; and, (b) people who contribute regularly to a community often want their contributions to be recognized by the organization.

As discussed earlier, truly voluntary [internalized] behavior is based upon internal value systems of the knowledge workers in contrast to pride and identity that characterize social influences based upon identification. Also, the above illustrations do not yield any response to the two questions posed at the beginning of the paper: Why do organizations often struggle with incentives for knowledge sharing for users of KMS while similar sharing of knowledge occurs without any incentive whatsoever in several external online communities? Why do million dollar investments of organizations in KMS often fail to

whet the interest of employees while some of the same employees regularly share knowledge in external online communities? We believe that the above problems are attributable to ambiguity in distinguishing between intrinsic and extrinsic motivation.

3.2.1 The Continuum of Motivation

Most discussions of knowledge management have treated extrinsic and intrinsic motivation as opposites. This is theoretically incorrect. Based upon self-determination theory (SDT) [11,15,35,36], motivation is more accurately represented as a *gradient* of knowledge workers' perceived locus of causality (PLOC) of specific behavior as illustrated in Figure 1.

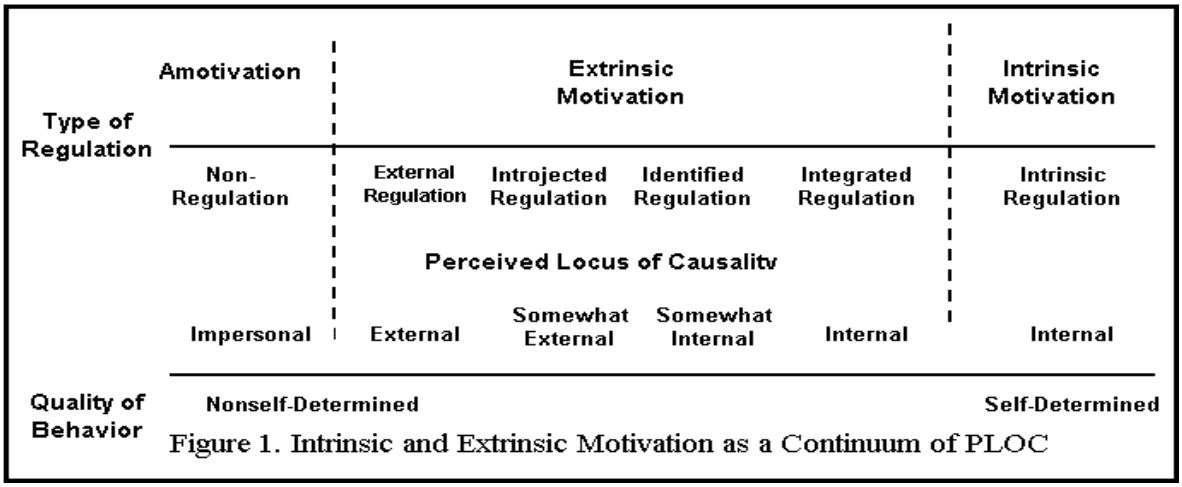

Figure 1. Intrinsic and Extrinsic Motivation as a Continuum of PLOC

SDT provides the most extensively developed and validated theoretical base in social psychology for understanding how rewards and incentives influence behavior [14]. A more complete conceptualization of intrinsic motivation would consider the *continuum* of PLOC which accounts for variations in the *degree to which an intentional action is self-determined* [13]. In the context of KMS use, PLOC would determine to what extent intentional knowledge use, knowledge creation, and, knowledge sharing are self-determined depending upon the actor's perceived locus of initiation for specific behavior.

In accord with the theory of self-determination, intrinsic motivation must be understood in a *relative* sense that contrasts external and internal locus of the user's behavior in terms of the individual's organismic need for competence and self-determination [12]. This extension has material significance for how organizational KM programs treat motivation and related issues of incentives and rewards.

Deci & Ryan [13] suggest that regulation of behavior can be viewed as being self-determined, controlled, or amotivated as depicted in Figure 1. Both self-determined and controlled behaviors are intentional, though only self-determined behaviors involve a true sense of choice, that is, a sense of feeling free in doing what one has chosen to do. Controlled behaviors, although undertaken with the *intent* of achieving an outcome are not truly chosen but compelled by some *internal or external* force. One feels one *has* to do them, whether to attain a monetary payment or to appease some generalized sense of authority. Thus intentional actions are differentiated along a "perceived locus of causality continuum," anchored by self-determination and [external] control. Amotivated actions, in contrast, are ones whose occurrence is not mediated by intentionality and hence is characterized by impersonal PLOC. According to the SDT taxonomy of self-regulation, external, introjected, identified and integrated regulation are all different forms of extrinsic motivation and need to be distinguished from amotivation and intrinsic motivation [37].

1. *Intrinsic Motivation* (Internal PLOC): "The inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn." For interest and enjoyment and the inherent satisfaction in the specific behavior, e.g. I enjoy sharing my knowledge as it gives me a sense of satisfaction.

2. *External Regulation* (External PLOC): "Such behaviors are performed to satisfy an external demand or reward contingency." Based on rule following and avoidance of punishment; e.g. My manager will be upset if I did not share my knowledge. I need to share my knowledge to do well on my performance evaluation.

3. *Introjected Regulation* (Somewhat External PLOC): "Introjection involves taking in a regulation but not fully accepting it as one's own. It is a relatively controlled form of regulation in which behaviors are performed to avoid guilt or anxiety or [to] attain ego enhancement such as pride." It is based on self- and other-approval or avoidance of disapproval; e.g. I am expected to share knowledge by my managers and my peers. I feel guilty if I do not share my knowledge.

4. *Identified Regulation* (Somewhat Internal PLOC): "Identification reflects a conscious valuing of a behavioral

goal or regulation, such that the action is accepted or owned as personally important." Based on self-valued goals or issues of personal importance; e.g. I feel great about myself when I share knowledge.

5. *Integrated Regulation* (Internal PLOC): "Integration occurs when identified regulations are fully assimilated to the self, which means they have been evaluated and brought into congruence with one's other values and needs." e.g. Sharing of knowledge makes perfect sense for me.

As illustrated in Figure 1, 'extrinsic' is not the same as 'external' in the sense of being outside of the individual. Introjection, identification and integration are just as internal to the person as intrinsic motivation. They are extrinsic regulatory styles in the sense that they are concerned with the outcomes or consequences of engaging in the behavior, rather than with the rewards inherent in performing the specific behavior.

This distinction is important because of the existing confusion in the literature about intrinsic and extrinsic motivation discussed earlier. Current discussions (cf: [44] and [9]) on incentives and rewards in knowledge management might lead one to assume that all behaviors emanating from within the individual are intrinsic and therefore of beneficial nature. From the self-determination theory perspective, this is not the case. The consequences of feeling controlled (i.e. non-self-determining) are the same whether the PLOC is internal or external as in the case of external regulation, introjection, identification, and, integration [15].

This distinction is also important as it explains how intrinsic motivation contributes to the success of many public online virtual communities. The suggestion is not that other behaviors are not present in such self-sustaining emergent communities of practice. Rather, intrinsic motivation ensures that the processes are primarily driven by key participants for their own interest and enjoyment to extend and exercise one's capacities, to explore, and to learn. The above distinction also explains the failure of many formalized online communities that are created by organizations and institutions but fail to build the critical mass or fail to generate value-added contributions to the knowledge processes facilitated by the KMS despite incentives.

4. Research Method and Measures

The context of the study is the implementation of a Windows NT based knowledge management system in the healthcare system to enable communication, coordination and collaboration within an organization wide reengineering effort. The system's implementation included initial training of users with the goal of immediate improvement in their effectiveness and productivity.

Data were collected from questionnaires completed by the users participating in the training sessions. Over a six-week period, 35 'performance-based' training sessions were conducted in which 239 potential users volunteered to participate. The specific focus of each 'performance-based' training session was on development of skills for performance-based activities – KMS enabled communication, coordination, and collaboration activities expected to directly influence organizational performance. These activities were identified by the managers as being most significant for relating the system based activities to organizational performance criteria. During each training session, the survey questionnaires were distributed to the KMS trainees who were expected to complete the questionnaire at the end of the training session. These surveys were returned to the instructor before the trainees left the classroom. 208 usable questionnaires were received, thus giving a response rate of over 87%. All users participating in the training sessions were cognizant of the potential impact of the new KMS as introduced by the senior management to them in very high profile meetings. All of them were familiar with the context of the high profile implementation of the new system championed by top executives, functional administrators, and departmental managers. The specific and explicit emphasis of the 'performance-based' training in use of the KMS was on imparting to the users proficiency, skills, and capabilities for effectively executing the communication, coordination, and collaboration activities enabled by the KMS and pre-specified by the organizational managers.

4.1 Instruments Used for Data Collection

KMS User Commitment is the degree of commitment of the knowledge worker toward the KM program and related systems and processes based on the effect of social influences on his or her behavior. It is measured in terms of Kelman's [19] processes of social influence discussed earlier -compliance, identification and internalization. The 12-item scale developed by O'Reilly and Chatman [32] and validated by Becker et al. [3] and Vandenberg et al. [43] in the context of organizational work commitment was adapted for measuring the user commitment to the KMS.

KMS User Motivation is the construct representing user motivation and is defined as the degree to which the system use is self-determined by the KMS user. It denotes the locus of causality of KMS use as perceived by the user. *Internal PLOC* (identification PLOC and intrinsic PLOC) implies that the locus of system use is more proximal to the user's own self, whereas *external PLOC* implies that the locus of system use is perceived by the user to be more proximal to external agents. In between the two ends lies *introjection PLOC* which implies behavior is motivated by approval seeking or by a disapproval minimizing mindset. For measuring PLOC, the scales are adapted from Ryan and

Connell's [36] methodology of 'self-determination,' which they used to determine the respondent's *perceived locus of causality* for one's actions.

The measures used for empirical validation are listed in Appendix 1.

4.1.1 Reliability and Validity of Measures

The refinement of measures for the proposed constructs follows Churchill's [6] eight-step procedure. Principal components analysis and maximum likelihood analysis using both varimax and oblimin rotations were used and compared for each of the proposed constructs. The distinct factors were confirmed from the corresponding scree test plots. Cronbach's alpha was used for determining the reliability of individual scales and subscales. Convergent and discriminant validity of the measures was verified by observing the correlations between the variables of possibly overlapping components.

4.2 Empirical Validation of KMS User Commitment

The principal component analyses with varimax rotation for the proposed construct of KMS user commitment yielded 2 distinct factors instead of the 3 proposed factors: Compliance, Identification, and Internalization. All four items for Compliance loaded on a distinct factor, however, the three items of Identification and three items of Internalization loaded together on another factor.

Factor loadings for all variables, which represent the correlations between the variables and the respective factors, are greater than 0.55 and are thus considered high [31]. Together, the two observed factors account for 60.31% of the variability of the original ten variables representing KMS user commitment.

The scree test plot verifies the presence of the two distinct factors having eigenvalues greater than 1. This observation is consistent with O'Reilly, Chatman and Caldwell [33] and Sutton and Harrison [40], whose empirical validation of compliance, identification and internalization as dimensions of organizational work commitment yielded similar two-factor solutions.

Together, the two factors account for 60.45% variability of the original ten variables. Cronbach's alpha for the KMS user commitment instrument composed of the original 10 items is .8047. Alpha for the Compliance, Identification, and Internalization subscales underlying KMS user commitment were .74, .76, and .77, respectively. However, when the two scales for Identification and Internalization are combined, their reliability is higher than either separately. The alpha score for the combined IDIN (Identification + Internalization) scale is .86.

Because all ten proposed items for KMS user commitment construct have high loadings, and the two scales achieved after factor extraction have high reliability, all ten proposed items of this construct were retained in the refined instrument.

Rotated Component Matrix [a]

	Component	
	1	2
COMP1	-.173	.792
COMP2	.286	.773
COMP3	-4.1E-02	.718
COMP4	.356	.661
IDEN1	.863	-.121
IDEN2	.732	.130
IDEN3	.685	.133
INT1	.704	.190
INT2	.752	-6.2E-02
INT3	.844	.124

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

This observation was also verified by examining the loadings of individual items on the two factors that were extracted from the principal components analysis. It was also verified that the two observed factors are distinct, because the items within the scales correlate highly and the items across the scales have low correlations. Specifically, a high correlation was found between the items of the Compliance scale as well as between the (Identification + Internalization) scale and a low correlation was found across the items of the two factors. Convergent and discriminant validity of the measures was thus verified by observing the correlations between the variables of possibly overlapping components.

Empirical validation of the measures of KMS User Commitment supports prior theoretical discussion that questions the dichotomous assumptions about simple presence or absence of user commitment to use, sharing, renewal, or creation of knowledge. It also suggests that the linkage between the information-based model and the knowledge-based view of organizations needs to be informed by understanding KMS user commitment in terms of compliance, identification, and internalization [45].

4.3 Empirical Validation of KMS User Motivation

The principal component analyses with varimax rotation for KMS user motivation yielded three distinct factors. The scree test plot verifies the presence of the three distinct factors, each having eigenvalue greater than 1 that together explain 66.7% of the total variance:

- **External Regulation** (External PLOC): Consisting of EXPLOC2, EXPLOC4, EXPLOC6, IJPLOC8. The last item (Because my supervisor would think that I should use the KMS) seems to fall in the *rule following* and *avoidance of punishment* category characterized by External PLOC.

- **Intrinsic Motivation** (Internal PLOC): Consisting of INTPLOC1, INTPLOC2, IDPLOC3, IDPLOC4, IDPLOC5. These items are all considered under the category of Intrinsic PLOC to include items that reflect *self-valued goals* or *issues of personal importance*, as well as items that characterize the notions of *enjoyment* and *fun*. In this broader notion, Intrinsic PLOC is considered to stand for *personal fulfillment*.

- **Introjected Regulation** (Somewhat External PLOC): Consisting of IJPLOC1, IJPLOC2, IJPLOC3, IJPLOC4, IJPLOC5, IJPLOC6, IJPLOC7 and EXPLOC7. All these items, including the last item originally under External PLOC, are considered as items characterizing seeking *self- and other- approval* or *avoidance of disapproval*.

Alpha for the 17-item PLOC scale was .88, which is comparable with earlier observations for the larger set of users. The Alpha scores for the three subscales EXPLOC, INTPLOC, and IJPLOC are also comparable with the values obtained earlier: .81, .84, and .92, respectively.

Rotated Component Matrix [a]

	Component		
	1	2	3
IJPLOC3	.866	-3.0E-02	.177
IJPLOC5	.855	5.61E-02	3.52E-02
IJPLOC7	.849	6.55E-02	6.86E-02
EXPLOC7	.837	-5.1E-02	.123
IJPLOC6	.786	4.21E-02	.120
IJPLOC4	.737	.191	.206
IJPLOC2	.731	6.88E-02	.237
IJPLOC1	.633	.206	.328
IDPLOC5	-2.7E-02	.878	-5.3E-02
INTPLOC2	-1.1E-02	.873	7.81E-02
INTPLOC1	9.90E-02	.838	4.24E-02
IDPLOC4	.103	.784	4.72E-02
IDPLOC3	.121	.492	.214
EXPLOC6	3.81E-02	.157	.813
IJPLOC8	.222	6.82E-02	.754
EXPLOC4	.213	.132	.732
EXPLOC2	.209	-7.3E-02	.701

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

The factorial solution of our exploratory analysis is comparable with other similar analyses in other domains such as that offered by Ryan and Connell [36] who observed that the items load on two clean subscales, one external and one internal, the two representing opposite ends of the PLOC continuum. In addition, the middle-ground items, such as those originally in the introjection and identification categories, generally manifest a cross-loading pattern.

It was also verified that the three observed factors are distinct, since the items within the subscales correlate highly and the items across the subscales have low correlations. Specifically, the variables within each of the three observed subscales had high correlations with other variables within the same scales and low correlations with other variables within other scales. Convergent and discriminant validity of the measures was thus verified by observing the correlations between the variables of possibly overlapping components.

Alpha for the KM user motivation instrument composed of the original PLOC scale containing 22 items was .78. However, the elimination of five items that loaded on more than one factor resulted in a noticeable increase in reliability: Alpha for the shortened KM user motivation scale containing 17 items is .92. Alpha for the EXPLOC, INTPLOC, and IJPLOC subscales obtained after elimination of five items that loaded on more than one factor are .777, .845, and .916, respectively.

Empirical validation of the measures of KMS User Motivation supports prior theoretical discussion that questions the dichotomous assumptions about simple presence or absence of user motivation in using, sharing, renewal, or creation of knowledge. It also suggests that the linkage between the information-based model and the knowledge-based view of organizations needs to be informed by understanding KMS user motivation in terms of the KMS user's degree of self-determination of behavior pertinent to use, sharing, renewal, or creation of knowledge.

5. Discussion

Despite extensive literatures on knowledge management that have grown over the past few years, there are critical gaps in existing knowledge that have significant implications for research and practice in knowledge management [1,18]. This study contributes to development of theory, conceptualization, and measurement of KMS user motivation and commitment as antecedents of KMS implementation success. Industry surveys as well as academic research literatures suggest that these two constructs are of critical importance to advancement of research and practice for successful implementation of organizational KMS.

This study developed the theoretical bases for understanding the knowledge workers' commitment and motivation constructs and supported these with empirical validation of the proposed constructs in the context of a real world organizational study of KMS implementation. Future empirical research on the integration of motivation and commitment within diverse implementation contexts of KMS and organizational knowledge management programs is expected to further advance the theoretical and empirical development of the proposed framework.

Prior literature has seemed to imply an infallibility of formal incentives, but theoretical and empirical evidence exists to suggest that incentives may not always be beneficial for facilitating creation, sharing, use, and application of knowledge. The theoretical bases explained in this paper and validated in prior empirical studies in other domains also suggest detrimental implications of formal incentives in similar social, cultural, and technical contexts [14] where value-driven behavior is desirable.

It is being increasingly realized that organizational performance often depends more on the ability to turn knowledge into effective action and less on the knowledge itself [1]. It has also been emphasized that further research in Information Systems should attempt to bridge the gap between the information-based model of the organization and the knowledge based view that recognizes diverse perspectives, values and interests of KM users [45]. By developing the theoretical, conceptual, and empirical basis for KMS user motivation and commitment issues, this study contributes to understanding of the critical linkages of motivation and commitment between the information-inputs and knowledge-action-outputs. Better understanding of the role of commitment and motivation in the above equation will facilitate balanced investments in IT infrastructures *and* social-cultural infrastructures required for leveraging tacit knowledge [39,42,46].

Better understanding of commitment and motivation of knowledge workers will also help in alleviating the "knowledge application gap" [1] resulting from what users know and what they [choose to] do *or* do not [choose to] do [34]. Organizational attempts to explicate, share and leverage tacit knowledge often presume *not only* capability *but* willingness on the part of knowledge workers to co-opt in the organizational agenda of knowledge sharing [1,39,46]. The measures proposed and validated in this paper would facilitate organizational assessment of such premises that have critical relevance for organizational attempts to explicate, share and leverage tacit knowledge.

It is also possible that motivation and commitment may change over time, as the KMS becomes a part of the daily work activities of the users. Therefore longitudinal studies of real world organizational implementations of KMS can further advance our understanding of how commitment and motivation dynamically evolve over extended use. Such longitudinal studies could deploy behavioral intentions to use the system as an intermediate variable along with specific organizational performance variables that can more concretely define the dependent variables related to KMS success. The context of performance-based training and performance-based activities described in this study may be helpful in bridging the gap between the information and technology inputs and the organizational performance related dependent variables.

Research is now needed to move beyond the source and state of knowledge to consider the conditions that facilitate knowledge creation [1]. Accordingly, researchers need to develop conceptual and theoretical linkages beyond the information-inputs to understand how they translate into knowledge-action-outputs and organizational performance outcomes. An understanding of these issues is necessary for the justification of organizational investments in the technologies and infrastructures as CEOs demand greater justifications of the dollars spent on KMS and projected contributions to the bottom line.

Also, a richer understanding of sense making and action linkages between information-inputs and knowledge-action-outputs is necessary. Existing literature in Information Systems has focused on social construction of knowledge and its implications for organizational performance. As individual level commitment and motivation of actors in a given social network influence success of KMS implementations, better understanding for relating the individual, group, and organizational levels of analysis is needed. Given the role of *meaning* and *sense making* in the above linkages, better theoretical, conceptual, and empirical understanding of these constructs will help link the information-inputs and knowledge-action-outputs. Any understanding of these constructs will need to consider how social influences and self-determination influence individual and collective meaning and sense making.

Sparse research on the above topics might help explain the existing failures of KMS implementations that are grounded on the information-inputs but are disconnected from knowledge-action-outputs. Therefore, there is need for better understanding of how to account for motivation, commitment, meaning, and, sense making in comparing human performance to machine performance [30]. Except for very limited cases, the sense making and self-determining nature of humans cannot be ignored in drawing any comparison between human performance and performance of machines. Better understanding of the issues outlined here is expected to result in KMS that can effectively leverage strengths of *both* technologies *and* humans for maximizing the organizational returns on investments in technology and social-cultural infrastructures of knowledge management.

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Appendix 1: Instruments For Measuring KMS User Commitment and Motivation

KMS User Commitment

Please indicate how strongly you agree or disagree with the following statements by circling the numerical value (on a scale of 1 to 7) that is closest to your response. Please use the following key to understand the scale: Strongly Agree=SA, Agree=A, Undecided=U, Disagree=D, Strongly Disagree=SD. The two extremes SA and SD were pegged to 7 and 1 respectively.

Internalization

INT1: The reason I prefer use of the KMS is because of what its use stands for.
INT2: I like using the KMS primarily based on similarity of my values and what its use stands for.
INT3: What the use of the KMS stands for is important for me.

Identification

IDEN1: I am proud about using the KMS.
IDEN2: I talk up the use of the KMS to my colleagues as a great use.
IDEN3: I feel a sense of "ownership" for the use of the KMS.

Compliance

COMP1: Unless I'm rewarded for using the KMS in some way, I see no reason to spend extra effort in using it.
COMP2: How hard I work on using the KMS is directly linked to how much I am rewarded.
COMP3: My private views about the use of the KMS are different than those I express publicly.
COMP4: In order for me to get rewarded in my job, it is necessary to use the KMS.

KMS User Motivation

Each of the following questions represents one of many possible reasons for a person's use of the KMS. Different users will have different reasons. We want to know how true each of these reasons is for you. Please indicate by circling the numerical value (on a scale of 1 to 7: the two extremes Very True and Not Al All True were pegged to 7 and 1 respectively) how true each of these reasons is for you in response to "I use the KMS because".

External PLOC (rule following; avoidance of punishment)
EXPLOC1: I'll get in trouble if I don't use the KMS.
EXPLOC2: that is what I'm supposed to do.
EXPLOC3: my superiors expect me to use the KMS.
EXPLOC4: using the KMS is required by my job description.
EXPLOC5: [So that] my supervisor wouldn't reprimand me.
EXPLOC6: using the KMS is compulsory in my job.
EXPLOC7: [So that] others won't get upset with me.

Introjection PLOC (self- and other-approval; avoidance of disapproval)
IJPLOC1: I want the boss to think that I'm a good employee.
IJPLOC2: I will feel bad about myself if I don't use the KMS.
IJPLOC3: I'll feel ashamed of myself if I don't use the KMS.
IJPLOC4: it bothers me when I don't use the KMS.
IJPLOC5: I want my colleagues to like me.
IJPLOC6: my friends would think that I should use the KMS.
IJPLOC7: my colleagues would think…I should use the KMS.
IJPLOC8: my supervisor would think…I should use the KMS.

Identification PLOC (self-valued goal; personal importance)
IDPLOC1: I want to understand how to use the KMS.
IDPLOC2: I want to learn how to use the KMS.
IDPLOC3: I want to find out if I am able to use the KMS.
IDPLOC4: I think it's personally important to myself.
IDPLOC5: I personally like using the KMS.

Intrinsic PLOC (Enjoyment, Fun)
INTPLOC1: using the KMS is fun.
INTPLOC2: I enjoy using the KMS.